

**ABSTRACT**

A microelectronic device is designed such that it includes a region between electrodes having a switchable ohmic resistance wherein the region is made of a substance comprising components  $A_x$ ,  $B_y$ , and oxygen  $O_z$ . The ohmic resistance in the region is reversibly switchable between different states by applying different voltage pulses. The different voltage pulses lead to the respective different states. An appropriate amount of dopant(s) in the substance improves the switching, whereby the microelectronic device becomes controllable and reliable.